

THE TRANSFORMATION OF THE ENERGY SECTOR

ELECTRIC VEHICLES

E-trucks on track to beat diesels on cost

David Ferris, E&E News reporter • Published: Tuesday, March 16, 2021



Tesla Inc. released a video Sunday of an electric semitruck prototype driving around a company test track in Fremont, Calif. @Tesla/Twitter

Electric freight trucks now ramping for the roadway could cost less than today's diesel trucks over the life of the vehicle, according to a new study.

By 2030, they could cost half as much if the electric grid keeps up with vehicle technology and policymakers offer loads of help.

The study compares an existing heavy-duty diesel truck from Volvo to the Tesla Semi, the electric freight tractor that is two years behind schedule and has a new target date of the end of this year.

Tesla Inc. grabbed a fresh round of attention this weekend when it released a [video](#) of its truck rounding a test track. To underscore the electric vehicle maker's emphasis on freight, Tesla moved Jerome Guillen, the president of automotive efforts, to a new role as head of heavy trucking.



Jerome Guillen. Tesla/YouTube

Though Tesla's vehicle gets a lot of buzz, other, traditional truckmakers are also prototyping electric trucks, including Volvo Trucks Corp. and Daimler Trucks North America.

The study is a joint effort of researchers at Lawrence Livermore National Laboratory; the University of California, Los Angeles; and the Goldman School of Public Policy at the University of California, Berkeley.

The headline finding: An electric heavy-duty truck built at today's battery prices could cost about 13% less per mile over the life of the vehicle. By 2030, that could drop to 50% if a host of "ifs" also fall in line.

The sticking point for today's buyers is the sticker price. The study looked at the total cost of ownership, including the purchase price along with costs to fuel and maintain the vehicle for the years it is in service.

But today, an electric truck costs 75% more than a diesel, "which experience suggests is a major barrier to adoption," the authors wrote.

The endeavor is worthwhile because of heavy-duty trucking's outside role in air quality. The study pointed out that heavy-duty beasts make up only 11% of vehicles on the road but account for almost half of vehicle carbon emissions and 71% of particulate emissions that lead to premature deaths.

"Electric trucks appear ready to meet the cost and performance demands for a substantial share of regional and long-haul trucking today," the report said.

The study compared the specs for the future Tesla Semi against an existing diesel, the Volvo VNL 400.

Batteries for an electric truck today have a realistic highway range of 375 miles and cost about \$135 per kilowatt-hour. Such a vehicle would pay for itself in three years and save the operator \$200,000 over its life, the report found.

A continuing plunge in the cost of ownership by 2030 is based on events that haven't yet come to pass. Battery prices would decline by more than half, to \$60 per kWh. Vehicles would be designed to be more aerodynamic. Truck buyers would profit from subsidies to reduce smog and greenhouse gas pollution, some of which have not been written.

The study looked at the many trade-offs between weight and cost for electric and diesel heavy-duty trucks.

While the batteries in a heavy-duty electric truck are extremely heavy, the study found that tonnage would be partially offset. Many parts of a diesel truck — the engine, cooling systems and transmission — would be removed, subtracting a quarter of the vehicle's weight and much of its cost.

The increased weight of the batteries would require the truck to shed a small amount, 3%, of its precious capacity to carry payload.

But the study concluded this trade-off wouldn't apply to most trucks. The average truck's carrying capacity is limited not by its weight, but its bulk. Trucks that do carry heavy loads could be made lighter by being made with aluminum instead of steel.

As vehicle battery prices drop, the report noted, "charging costs are beginning to loom larger."

Fueling is one of the hardest parts of creating an electric truck fleet. The cost and complexity of installing chargers and the attendant grid upgrades, and the unpredictable price of electrons, are among the hurdles ([Energywire](#), Oct. 16, 2020).

In order to succeed, the nascent field of heavy-duty truck charging will need to transform, the report said.

Chargers will need to be used frequently and will need to be based on a more sophisticated rate structure than the existing system of demand charges, which set the customer's billing rate at its maximum moment of electricity consumption.

These new rates will be based on flexible schedules that would have trucks charging when electricity is abundant and at wholesale instead of retail rates. The study assumed that these changes would be implemented and lead to electricity prices half of what they are today.

Strong policy is needed to coordinate the investments in vehicles and charging, the report said.

The report added that these electric behemoths will, like other new technologies, need to roll across a valley of death.

It "requires surviving a period of infancy of this industry," the report said, "marked by low demand for vehicles and charging and consequently unprofitability."

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